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be no difficulty in maintaining in these programs a scientific standard of papers read as high as that now presented by the professional societies. Indeed, there would be no impropriety, particularly in the case of any section which holds summer meetings, in relegating the reading of technical papers at the convocation meeting to the affiliated professional societies, the section, if possible, offering, in addition to the vice-presidential address, one or more set papers or discussions of more general interest.

The solution when finally wrought out will no doubt come by a process of evolution rather than by revolution, and the present trend is clearly in the direction of reserving the time of convocation week very largely for the reading of papers by the technical societies. Any attempt to force these societies into the summer months is foredoomed to failure.

C. JUDSON HERRICK.

THE CASE OF WILLIAM J. LONG.

TO THE EDITOR OF SCIENCE: The criticism of William J. Long's published observations on the habits of animals inaugurated so vigorously by John Burroughs in *The Atlantic Monthly* for March, 1903, and continued no less forcibly by William Morton Wheeler in your issue of February 26 arouses no little interest in the personality and methods of a writer whose work has met with so unfavorable a reception by naturalists.

Are we to believe the accusation that the author in question, to put the matter squarely, is a 'liar,' or have we in Mr. Long a naturalist whose powers of observation, discrimination and interpretation are so far beyond those of any other student of nature, living or dead, that he is in effect a Galileo among animal psychologists?

It can not be denied that Mr. Long, in spite of his youth, has placed upon record more remarkable statements regarding the behavior of the birds and mammals of New England and New Brunswick than can be found in all the authoritative literature pertaining to the animals of this region.

The story of the crows and their game with a china ring; of the kingfisher that stocked an

isolated pool with fish in order that it might easily teach its young the art of fishing; of the partridge that repeatedly drummed a roll-call for the two missing members of a brood of eleven; of the red squirrel with cheek-pouches; of the porcupine that coiled in a ball before rolling down hill; of the loon that hatched its eggs, not by sitting on them, but by gathering them close to her side with her wing; of the woodcock that placed its broken leg in a plaster cast; of the ducks that have learned to drown salt-water mussels in fresh-water pools; of the great blue heron that scattered a pollywog in fragments on the water as bait to draw fish within spearing distance: these and many other equally remarkable observations and experiences are recounted with a circumstantial detail that carries conviction to all but the informed.

Indeed, one has not to read far in any of the half a dozen or more volumes which Mr. Long has produced to discover some more or less remarkable description of the actions of animals.

The nature of their contents and their undeniable literary merit furnish abundant reason, therefore, why Mr. Long's works should claim not only the attention of naturalists, but of the public generally, and again it may be asked, is the unsparing criticism to which they have been subjected warranted?

An apparently satisfactory reply to this query is furnished by a defense of Mr. Long published in the Boston *Evening Transcript*, March 7, 1903, and by Mr. Long himself. The writer of the *Transcript* communication seems to have been acquainted with Mr. Long at Andover Theological Seminary. After saying that Mr. Long prepared himself for college by 'solitary' study and that in entering the sophomore class he had not experienced that year in an undergraduate's life 'when a young man learns to take himself for very little,' he continues:

From both these circumstances it comes about that we have here a man easily tempted to overrate his personal knowledge, a man tempted to superficiality, a man likely to draw rash and ill-considered conclusions. It is also to be remembered that Mr. Long is of Irish extraction—inflammable, poetic and volatile in temperament.

No matter how great his learning up to a certain point, he is continually in peril of making irrational ventures beyond that point, lured forward by pure imagination. This has come out in his preaching. Eccentricities and extremely radical outbursts have had a disturbing effect upon his audiences and have limited his success. It is just this sort of thing that has made him the prey of Mr. Burroughs. I well remember an utterance of Mr. Long's in a class-room in Andover when he took issue with the professor, beginning by saying: 'I always love to think'—to which the professor replied, 'Mr. Long, we are not concerned with what we love to think, but with what we ought to think.' Here was the whole situation in a nutshell. What he has loved to think and not what he ought to think has colored whatever has met his eyes in the theological as well as the biological world.

Honest, absolutely honest, and yet not quite telling the truth—that is a seeming paradox, but a real paradox only as many a poetic temperament is itself a paradox, and any poetic temperament, any temperament to which imagination is all but reality, and to which the thing loved and, therefore, the thing sought, is by a natural consequence the thing believed—any such temperament will prepare bitter grief for itself when it enters the world of natural science. Scientists have always to guard against the personal equation. This is well illustrated in the disappearance from scientific use of the pencil sketch and its replacement by the photograph. Let me draw the strata in yonder rocks, and nine chances in ten I shall unconsciously draw into them the theory which I intend them to illustrate. The camera, on the other hand, tells no lies, and very plainly Mr. Long is some other thing than a camera. His finished product is art, not science; it is the forest plus Mr. Long; it is the woodland folk introduced, interpreted, beloved—I had almost said at the first, created by Mr. Long. And I wonder whether, after all, Mr. Burroughs is not equally writing his own delightful personality into his own charming pages. The world-wide difference comes in at one point only. Mr. Burroughs is temperamentally fitted to interpret nature through the forms of literature; Mr. Long is not so fitted.

Evidently the author of these illuminating paragraphs knew whereof he wrote, and his delineation of Mr. Long's peculiar characteristics appears to explain satisfactorily that gentleman's ability to make more startling discoveries in one short lifetime than have

fallen to the lot of naturalists in preceding centuries. Additional light is thrown on Mr. Long's methods and their results by his confession that he has 'never studied nature consciously, but only loved it,' and has found out many of its 'ways long ago, guided solely by a boy's instinct' ('Ways of Wood Folk,' preface); while the dedication of 'Fowls of the Air' is a surprising avowal of its author's point of view. It reads:

To the Teachers of America who are striving to make nature study more vital and attractive by revealing a vast realm of nature outside the realm of Science, and a world of ideas above and beyond the world of facts, these studies from nature are dedicated.

To the naturalist further comment will be unnecessary, but it doubtless will be inquired why make all this disturbance about one of scores of inaccurate producers of so-called 'nature' books? Chiefly, it may be replied, because of the magnitude of Mr. Long's offenses, of the audience which he has won through his marked literary gifts in descriptive writing, and of the prominence injudicious criticism has brought him.

In a well-meant but somewhat ill-considered attempt to stamp out the fire, Mr. Burroughs merely scattered it. From an insignificant smudge, it has become a roaring blaze and its sparks are kindling throughout the land.

It requires the briefest consideration of the fact that tens of thousands of Mr. Long's books have been sold for supplementary reading in the schools—where, judged only by their literary charm, they are almost uniformly commended by teachers—to realize their far-reaching influence for evil. As I write, a prominent educational journal is received containing a review of Mr. Long's latest book, which the reviewer says, is 'by one who knows whereof he speaks, and who has studied so carefully and lovingly that he will make revelations that will hold us breathless.' This is a fair indication of the esteem in which Mr. Long and his works are held by the average teacher.

Is it not, then, the duty of naturalists to enlighten the general public, and especially those entrusted with the education of children,

in regard to the real character of Mr. Long's efforts to reveal 'a vast realm of nature outside the realm of science' in 'ideas above and beyond the world of facts'?

FRANK M. CHAPMAN.

AMERICAN MUSEUM OF NATURAL HISTORY.

THE METRIC SYSTEM.

TO THE EDITOR OF SCIENCE: It is now years since the metric system has been authorized and permitted in this country and yet very little progress has been made in its practical introduction. We still labor with the old system. We can never tell in statistics or contracts what a ton of coal means (long or short) unless it is explicitly stated. And so in water analyses, they are stated in three or

pints, and a gallon four such quarts, and a peck eight such quarts, and a bushel thirty-two such quarts, and no other measure of volume shall be permitted, the distinction between fluid and dry measure being abolished.

3.* The U. S. standard foot shall be the length of the edge of a cube which shall contain 1,000 U. S. standard ounces of water under certain conditions of temperature and pressure, *i. e.*, 62.5 U. S. standard pints. The popular use of the terms would not need be changed *at all*, and the actual change of units would be so slight (ten per cent. or less) that it would not popularly be noticed, as may appear from the following table:

United States Standard.				Metric.			
.985	present ton	=	1	proposed ton	=	1	metric ton.
1.102	" pounds	=	1	" pound	=	$\frac{1}{2}$	Kilo., German 'Pfund.'
1.102	" ounces	=	1	" ounce	=	$\frac{1}{32}$	Kilo. = 31 $\frac{1}{2}$ grams.
1.05671	" liquid pints	=	1	" pint	=	$\frac{1}{2}$	liter.
.9081	" dry pint	=	1	" quart	=	1	liter
.9081	" " bushel	=	1	" bushel	=	32	liters.
1.05671	" liquid gallons	=	1	" gallon	=	4	"
.984	" foot	=	1	" foot	=	{ $25\frac{8}{15}$ cm. 315 cm.	

four different ways, so that it is hard to compare them. Even if we know they are in grains per gallon, it remains to be determined whether the gallon is imperial or U. S.

Allow me to suggest a method of introducing the metric system which might meet much less friction and meet all practical purposes.

The proposed legislation would be as follows:

1. On and after January 1, 1906, the U. S. standard ton shall be the metric ton, which shall contain 2,000 U. S. standard pounds, each of which shall contain 16 U. S. standard ounces. No other ounce, pound or ton weights, or weights purporting to be fractions or multiples thereof, shall be used under penalty.

2. The U. S. standard pint shall be the volume of one U. S. standard pound of pure water under certain conditions of temperature and pressure, and shall be equivalent to one-half liter. A quart shall be two such

Moreover, the old proverb, 'A pint is a pound the world around,' will be strictly true, and in water analyses a nickel's weight in a pint will be the same as an ounce per cubic foot and, specific gravity apart, the same as parts per thousand.

Especially in ending the long wrangle over various tons, I think the proposed changes would be decided improvements, and the differences between wet and dry measure should be abandoned.

ALFRED C. LANE.

SEX DETERMINATION IN BEES AND ANTS.

IN SCIENCE for December 25, 1903, Professor W. M. Wheeler characterizes as lacking in critical caution and 'apodictic' the statement that 'the egg of the bee, if unfertilized, invariably develops into a male, but if fertilized into a female.' If Wheeler's objection is directed merely against the form of this statement and not against its general content, if he desires merely the eradication of the word

* This is not so essential to the scheme.